SULLIVAN CREEK HYDROELECTRIC PROJECT EXISTING INFORMATION ANALYSIS

COLVILLE NATIONAL FOREST

Introduction

The Sullivan Creek Hydroelectric Project, FERC No. 2225, (SCH) is owned by the Public Utility District No. 1 of Pend Oreille County, Washington (PUD). The Federal Energy Regulatory Commission (FERC) licensed SCH on November 25, 1958. The existing license expires on October 1, 2008.

The SCH is located at Sullivan Lake and along Sullivan Creek, in northeastern Washington State, approximately 3 miles east of the town of Metaline Falls, Washington. The original SCH was constructed by Inland Portland Cement Company in 1909 and supplied electricity to the town of Metaline Falls. The Project consisted of Sullivan Lake dam, Mill Pond dam, an intake structure on Mill Pond, a wooden flume, canal, tunnel and powerhouse. The Project operated on National Forest System (NFS) lands under a special use permit. In 1922 Mill Pond dam was replaced by a concrete dam about 130 feet long and about 55 feet high, constructed just below the log-crib dam. In 1956, the powerhouse was shutdown because of maintenance problems with the wooden flume that conveyed water from Mill Pond to the powerhouse. At that time, it was decided to terminate operations because cheaper electricity was available from Bonneville Power Administration (BPA). In 1958, the Federal Power Commission, now FERC, licensed the Project as a non-generating project, with provision for adding generating capabilities later. The Project boundary was restricted during the period of investigation for re-establishing power generation. The PUD purchased the Project in 1959. In 1992, FERC reclassified Sullivan Lake dam to "high hazard" and required that structural measures be designed to increase the factors of safety for stability; the required work was completed a short time later.

Sullivan Lake is a natural lake, which is increased in size by the presence of the Sullivan Lake dam. Currently, SCH stores and releases about 31,000 acre-feet of water annually, in accordance with the Pacific Northwest Coordination Agreement and its FERC license. Sullivan Lake pool covers 1,240 acres and is maintained to the extent possible at a constant elevation of 2,588.7 feet above mean sea level (msl) during the months of May thru September. Beginning in October, the reservoir is drawn down to provide storage for spring runoff. Mill Pond is kept at a relatively constant 2,506 feet msl. The horseshoe tunnel that connects the forebay to the powerhouse is still being used to back-feed water to the forebay as part of the water supply system of the town of Metaline Falls. The powerhouse is unused except for a small portion that houses a backup pump for the

municipal water supply. The PUD currently holds three water rights on Sullivan Creek, two of these are for power production.

The Project currently consists of Sullivan Lake dam, Mill Pond dam, Mill Pond Historic Site, a wooden flume and canal, a forebay, a horseshoe-shaped tunnel and powerhouse. Sullivan Lake has a gross volume of 270,000 acre-feet with 31,000 acre-feet of active storage capacity and covers 1,240 acres at its full pool elevation of 2,588.7 feet (msl). Sullivan Lake dam is a 58-foot long by 29-foot high concrete gravity dam and spillway abutted by two concrete gravity wing walls. Mill Pond dam is a 134-foot long by 55-foot high concrete gravity dam with an 84-foot long ogee spillway and an 850-foot long earthen dike at the left abutment. The wooden flume was about 12,500 feet long and is badly deteriorated, mostly missing. The remainder of the Project, which is not located on NFS lands, consists of a 2,200-foot long earthen canal leading into a small head-pond (forebay) 300 feet by 300 feet, a 1,160-foot long by 8 –foot diameter horseshoe tunnel connecting the forebay to the penstock. A 275-foot long steel penstock extends from the tunnel to the powerhouse. The powerhouse, located immediately upstream from State Highway 31, is a 100-foot long by 38-foot wide brick and masonry structure. There is no generating or switching machinery in the powerhouse.

Approximately 540 acres of NFS lands are contained within FERC's Sullivan Creek Hydroelectric Project boundary.

Existing Information

Setting and General Environment

The SCH is located on Sullivan Creek, which is a tributary of the Pend Oreille River. Sullivan Creek flows westerly, entering the eastside of the Pend Oreille River near Metaline Falls at approximately river mile (RM) 27.

Access to the Project is by way of County Road 9345, Sullivan Creek Road. This road runs from State Highway 31 easterly along Sullivan Creek, continues south along the west side of Sullivan Lake eventually returning to State Highway 31 south of Ione, Washington.

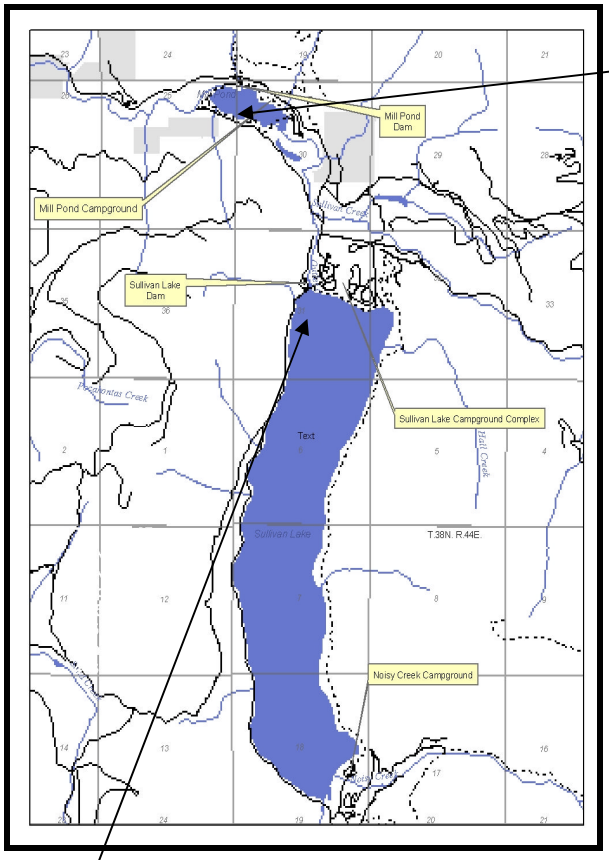
The SCH is located on NFS lands and lands owned by the PUD. There are 11 private landowners outside the Project boundary, but in the vicinity of the Project between Sullivan Lake Dam and Mill Pond. In addition, there are 13 recreation residences under permit by the USDA Forest Service within the Project area. Lands within the FERC restricted Project boundary are all NFS lands.

The SCH is surrounded by the Selkirk Mountains. The climate of the area has both continental and maritime air mass influences. Prevailing westerly winds controls most of the weather systems affecting the northeastern part of the state. Winters are rather long and influenced by cold air from the Canadian Arctic moving parallel to major north-south drainages. Summers are generally warm and sunny with light rainfall. Air from the Pacific Ocean has a moderating influence throughout the year. Daily temperatures range from 15°F to 30°F in the winter and 46°F to 76°F in the summer. Annual precipitation varies from 15 to 25 inches in the valleys to 40 inches in the mountains.

The surrounding topography is relatively abrupt and the mountains are steep and rugged. The vegetative cover is typical of coniferous forests of the region. Two main tributaries, Harvey Creek and Sullivan Creek, affect the hydrology of the Project. Sullivan Creek and Harvey Creek originate at the peaks of Salmo and Monumental Mountains at elevation 6,400 and 5,711 feet, respectively. Sullivan Creek drains the area east and northeast of Sullivan Lake, a total drainage basin area of approximately 70 sq. miles. Harvey Creek drains the area south and southeast of Sullivan Lake, a total drainage area of approximately 52 sq. miles. Sullivan Lake is formed by the impoundment of Harvey Creek. Outlet Creek is formed by the outflow from Sullivan Lake and joins Sullivan Creek approximately 0.5 miles downstream of Sullivan Lake Dam.

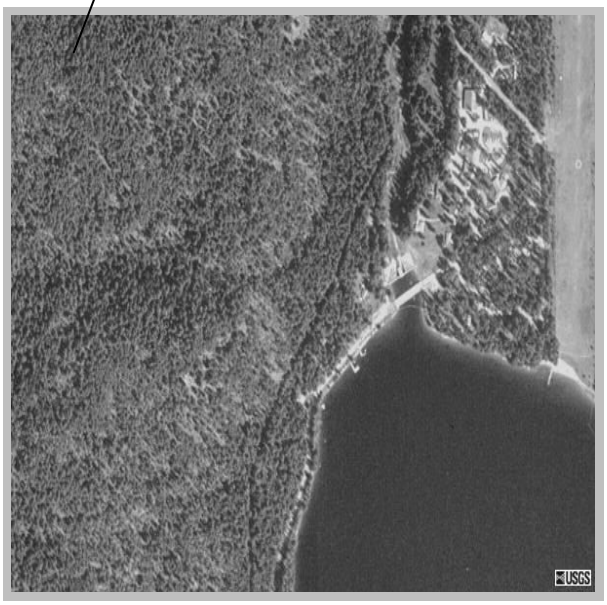
The closet population centers are the communities of Ione, Metaline and Metaline Falls located approximately 60 miles north of Newport, Washington and approximately 95 miles north of Spokane, Washington. They are the northern most population centers in Pend Oreille County. The county has a total population of approximately 11,604 (1999 Census Bureau estimate). The reopening of the Cominco mine north of Metaline Falls has had a positive effect on the local economy.

Figure 1 – Reference Map



Mill Pond

Project Overview



Sullivan Lake Dam

Land Uses

Existing Condition

NFS lands located within and adjacent to SCH are a mixture of developed and undeveloped lands. There are NFS recreation sites at both Sullivan Lake and Mill Pond. The USDA Forest Service Sullivan Lake Ranger District administrative site is also located at Sullivan Lake, as well as 13 recreational residences under permit from the USDA Forest Service. County Road 9345, Sullivan Lake Road, provides access to the Project. USDA Forest Service management activities within the Project area have primarily been limited to recreation, timber harvest and wildlife management. Dispersed recreation is also evident throughout the area, principally along Sullivan Creek.

The presence of several developed recreation sites, as well as recreation residences, within and adjacent to the Project boundary is reflective of the recreational opportunities which the lake and Project afford. These facilities were developed in such a way as to maintain a natural setting around the lake, along Sullivan Creek and at Mill Pond. When the Forest Plan was developed in the late 1980's the majority of the NFS land immediately adjacent to the Project area was allocated to Management Area 3A, with an emphasis on roaded and unroaded recreation in a natural setting. Additionally, lands were allocated to Management Area 5 with an emphasis on scenery and timber production.

Land uses within the Project area have remained relatively unchanged over the term of the license with the exception of expansion and upgrading of recreation sites.

Scope of Analysis Area

The scope of the analysis area encompasses all NFS lands within and immediately adjacent to the Project boundary as defined in the FERC license.

Scenery Management

Existing Condition

The SCH lies within the mountainous northeastern corner of Washington State and includes the glacially sculptured Sullivan Lake and man made Mill Pond. The setting has provided a unique, high quality outdoor recreational experience for visitors since the early 1900s.

Figure 2 – Sullivan Lake from swim beach

The condition of the landscape is measured as scenic integrity. Scenic integrity is an evaluation of the human-caused deviations in form, line, color and texture from the landscape. The scenic integrity levels range in five categories from very high to very low. Generally, the moderates to high, high, and very high, categories are natural appearing where changes are not dominant. The low to very low categories would indicate deviation begin to dominate the landscape. Scenic integrity serves as a baseline measurement upon which potential changes can be measured in relative terms.

The current Forest Plan allocates the NFS lands surrounding Sullivan Lake and Millpond as a "Scenic Viewshed" (Sullivan Lake Road, Forest Plan 1988, FEIS III-102). The visual condition of this viewshed is listed as natural appearing, giving it a scenic integrity rating of high. The current analysis under the Forest Plan revision process will determine the future scenic integrity objectives for the area.

During the winter months however, Sullivan Lake is drawn down exposing stumps and bare mud flats. This temporary condition occurs during low use periods. The lake also has recreation residences and occupancy generally drops off after Labor Day with residents returning by mid-May. The majority of recreation visitors see the lake at full pool.

Millpond does retain stable shoreline vegetation.

Pend Oreille County planning has recognized the value of this landscape, and the importance of state and federal land management to the local economy and quality of life. They have set goals related to promoting the beauty of the county's natural attractions, and see this as a basis for building a more stable economy (Pend Oreille County Comprehensive plan, 1995 Draft). The major scenic concern is for the preservation of what is a unique, and highly valued, landscape.

Scope of the Analysis Area

The area within the viewshed, as designated in the current Forest Plan, provides views of the Project.

Recreation Management

Existing Condition

Spokane, Washington is approximately 120 miles driving distance from the Sullivan Lake/Mill Pond analysis area.

Demographic changes make it likely that during the next 30-year period, the use of the Sullivan Lake area will increase. These changes include increases in the number of traveling retirees, the amount of leisure time and money, the search for scenic places, etc. (Cordell 1999). The demand for trails, especially those near water, is high (Interagency Committee for Outdoor Recreation, 1995) and demand for recreational activities in a natural setting are increasingly important. Linear activities are noted as the most popular, and a "significant portion of all linear activity, especially walking and bicycling, takes place close to home. . ." (Interagency Committee for Outdoor Recreation, 2002).

The North Pend Oreille Scenic Byway (NPOSB) was established in 1993. The Chambers of Commerce and the County are promoting tourism in this area (Pend Oreille County Comprehensive plan, 1995 Draft). Local residents working together with the State on a Scenic Byway project through the area view the analysis area as a source of attraction, which could help develop a tourist-based economy.

Current use surveys at the developed campgrounds within the analysis area show that beginning in July and running through Labor Day the campsites are occupied to a level that suggests a need to consider expansion or development of new facilities. Prior to expansion of the existing facilities on NFS lands, there needs to be an evaluation of potential locations for overnight camping opportunities on both public and private lands in the area.

The existing recreation sites within the analysis area are part of the Colville National Forest 2005 Recreation Facility Master Plan process which considers the cost efficiency

of providing the existing site amenities and level of service, as well as whether the site supports the concepts proposed under the Recreation Niche statement for the Forest.

Sullivan Lake:

The water level of the lake fluctuates during the year with an annual draw down of approximately 25 feet during the winter months. The water level is held up during the summer months to accommodate recreation use.

Facilities at both Noisy Creek and Sullivan Lake recreation areas are in good condition due to recent reconstruction efforts and meet appropriate standards for accessibility, health and safety.

Noisy Creek Recreation Area:

The area is totally within NFS lands at the south end of Sullivan Lake. Facilities within the area include Noisy Creek campground, day use parking, and boat launch, trailheads for the Lakeshore Trail (Trail #504) and the Noisy Creek Trail (#588), a group camping area, and a privately owned recreation residence (under a special-use authorization).

Sullivan Lake Recreation Area:

The area is totally within NFS land at the north end of Sullivan Lake. The facilities within the area include East Sullivan Campground, West Sullivan Campground, day use parking, a boat launch, trailheads for the Lakeshore Trail (Trail #504) and the Nature Trail (#509), a group camping area, and several recreation residences (authorized under special-use authorizations).

Millpond:

The area is totally within NFS land approximately 1 mile northwest of the Sullivan Lake Recreation Area. The facilities within the area include Millpond Campground, Millpond Historic Site, trailheads for the Mill Pond Flume Trail (#520), South Mill Pond Trail (#550) and Elk Creek Trail (#560), and a picnic area. Facilities at Millpond have not been reconstructed and are in need of upgrading to meet current standards.

Recreation use levels for both the Sullivan Lake and Millpond areas are shown in the following table based on actual campground use counts provided by the concessionaire.

Table 1 – Recreation Use Levels

Campground Name	Number of Campsites	Percent Occupancy During High Use Weekends in 2003	Average Percent Occupancy During Season of Use* in 2003
East and West Sullivan Lake	48	93 %	54%
Millpond	10	83%	34%
Noisy Creek	19	87%	39%

* Season of use is the general open season when services are provided and facilities maintained.

Sullivan Lake includes day use areas at the East and West Sullivan and the Noisy Creek developed facilities. Use is concentrated at shoreline and boat launch areas. East Sullivan has a boat launch, dock and floating swim platform near the picnic area. West Sullivan has a picnic shelter and a designated swim area with swim dock. The lake is popular for boat fishing, water skiing, personal watercraft, kayaking, and canoeing. Fishing activity is for rainbow, German Brown, cutthroat, Kokanee, and ling cod (Burbot).

Trail #509 near East Sullivan is a 0.6-mile nature/interpretive walk. Trail #504 runs along the east shore and connects the Sullivan Lake Group Campground with the Noisy Creek Day Use area. The trailhead near the Noisy Creek Group Camp provides access to Trail #588 and the Hall Mountain Trail #540 leading to a former lookout site.

Mill Pond day use activity is concentrated at the Mill Pond Historic site where visitors can see remnants of the early 1900's hydroelectric project. Accessible, interpretive trail #520 loops through the historic site. There is also a low level of day use boating activity and use of the small lake for fishing (rainbow, German brown, eastern brook, and Kokanee).

Day users include those using the lake, viewing the scenery, picnicking, hiking, and visiting historic sites. Counts of day use parking permits provided by the concessionaire for the 2004 season show that day use facilities receive the heaviest use on Saturdays and Sundays. Since the area is close to local communities, it is assumed that many day users come for only part of a day. An estimated 90 % of the overnight users also utilize the day use facilities at both lakes. Additional day use occurs from locals and people passing through the areas while traveling the North Pend Oreille Scenic Byway and International Selkirk Loop corridor.

The site acreage and existing season of use is provided in the following table.

Table 2 – Recreation Facility Size and Season of Use

Recreation Facility	Acreage	Season of Use
East Sullivan Campground and Day Use Area	26	Week before Memorial Day through the week after Labor Day
West Sullivan Campground and Day Use Area	10	Same
Sullivan Group site	2	Same
Millpond Campground	10	Same
Millpond Historical Site	5	Same
Noisy Creek Campground, Day Use, and Group site	20	Same

Scope of Analysis Area

The analysis area includes Sullivan Lake, Mill Pond, Outlet Creek, Sullivan Creek (between Outlet Creek and Mill Pond), Lower Harvey Creek and the recreation facilities and residences affiliated with these areas. The area includes dispersed recreation opportunities and developed recreation facilities and trails.

Geology and Soils

Existing Condition

The SCH consists of two impoundment facilities – Sullivan Lake Dam and Mill Pond Dam. The affected environment includes the impoundment facilities and the streams (Harvey Creek, Outlet Creek, Sullivan Creek) extending from just above the Sullivan Lake to the Pend Oreille River. The geologic information is from Geologic Map of the Colville Quadrangle, Nancy Joseph, 1992. The soil information is from the Soil Survey of Pend Oreille County Area, Washington, USDA SCS, 1992

Sullivan Lake:

Sullivan Lake is a natural lake formed by glacial action. The natural outlet and dam are located on a moraine at the north end of the lake. The Sullivan Lake dam is about 30 feet tall. Under current operations, the lake level is lowered in the fall and winter, rises in the spring, and remains at 'full pool' through the summer.
The north end of the lake is a moraine. The moraine appears to be made of unconsolidated sand, gravels and cobbles[1]. The original outlet appears to have been

[1] During construction of the Outlet Bridge, liquification was experienced on the east most piling, suggesting that the interior of the moraine may include finer textured materials.

located about 100 feet upstream from the current dam (Sewell Engineering, 1920). The moraine appears to be porous – seeps occur on the downstream side of the moraine into Outlet Creek, and the water well on the Sullivan Lake Ranger District compound shows changes in response to lake levels. The primary soil on the moraine is Bonners silt loam. Any topsoil that may have existed in the reservoir fluctuation zone[2] has been eroded away. The beach material is mostly coarse gravel. The beach gravels do not appear to have eroded significantly from lake level fluctuations or wave action.

The east and west sides of the lake are characterized by steep, rocky slopes. The bedrock on the west side is Maitlen Phyllite, and on the east side the bedrock is dominated by both Maitlen Phyllite and Gypsy Quartzite. Soil series found along the sides of the reservoir are generally formed in residuum and colluvium. Common soils include Rufus, Belzar, Rasio, Hartill, Newbell, and Inkler. Rufus is shallow (<20" to bedrock); and Belzar, Hartill, Inkler and Rasio are moderately deep (20-40" to bedrock). Newbell is formed on glacial till and is deep (>60" to bedrock). Rufus, Belzar, Rasio, Newbell are found in complex with rock outcrops. In general, fines and topsoil that may have existed in the reservoir fluctuation zone have been eroded away. The resulting lakeshore is rocky and largely immune to the effects of further water erosion.

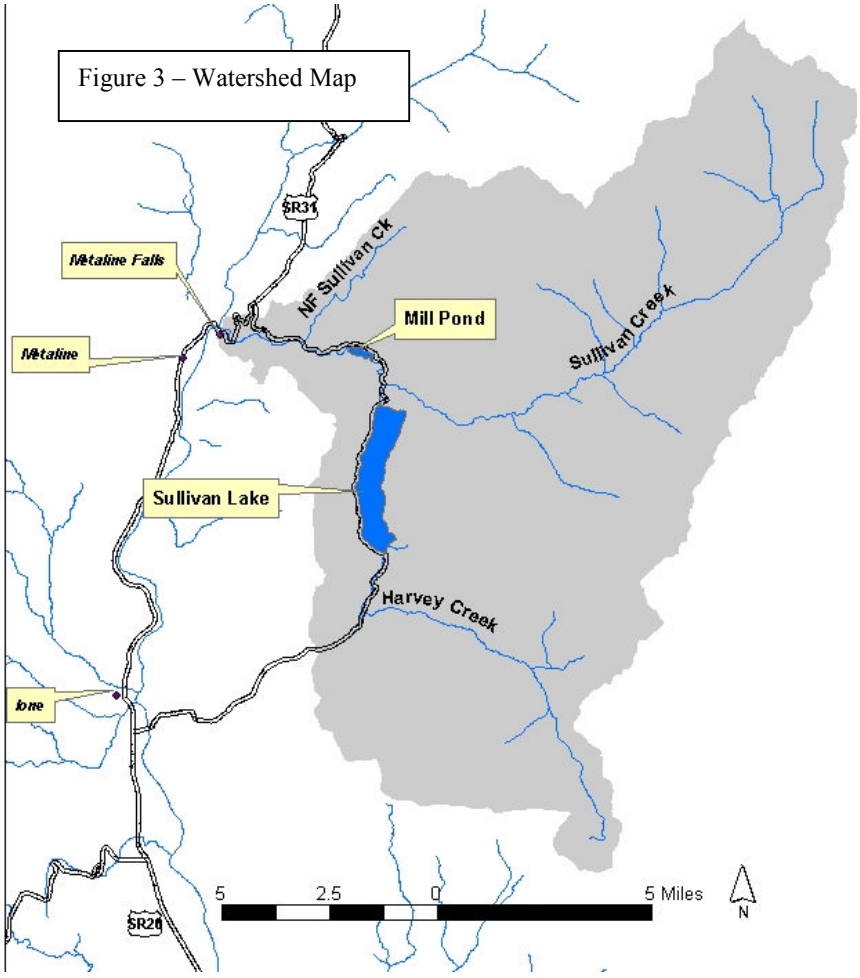


Figure 3 – Watershed Map

Most of the water enters the lake at the south end – Noisy Creek enters in the southeast corner and Harvey Creek enters at the southwest corner. Harvey Creek is the largest stream flowing into the lake. The gradient of the Harvey Creek valley as it enters

[2] The reservoir fluctuation zone is the shoreline between the normal high- and low-water levels.

Sullivan Lake is very low. The south end of the lake is characterized by nearly flat slopes of fine-textured depositional materials. Scotia series, formed on glaciofluvial material, is the primary series mapped at the south end of the lake. This flat depositional land type extends up the Harvey Creek valley for about a mile. Noisy Creek Campground and some private homes are built on this depositional land type.

About 7,000 feet (1.3 miles) before it enters Sullivan Lake, Harvey Creek turns abruptly to the east-southeast and enters a steep, narrow canyon. The canyon contains several small landslides in glacial material and bedded metasedimentary rock, visible from FR 1925. The landslide material includes both rounded cobbles and boulders (glacial), and angular material (metasedimentary). These landslides have provided a lot of bedload material into Harvey Creek. Bedload deposits have been observed about 7,000 feet upstream from the lake, where Harvey Creek changes from a steep to a flat gradient.

Where Harvey Creek enters Sullivan Lake the deposition zone is seasonally inundated by the lake. This mud-flat is not covered by water in the winter. This flat contains many stumps from when the dam was built in the early 1900's. For the most part, these stumps have neither been buried nor have they been exposed – the roots are right at the current surface level. Along Harvey Creek the deposited material is coarse cobbles mixed with some sand. This coarse zone is about 50 feet wide (on each side of the creek). As you go past this 'gravel bar' the material is fine textured sand and silt greater than 30 inches deep.

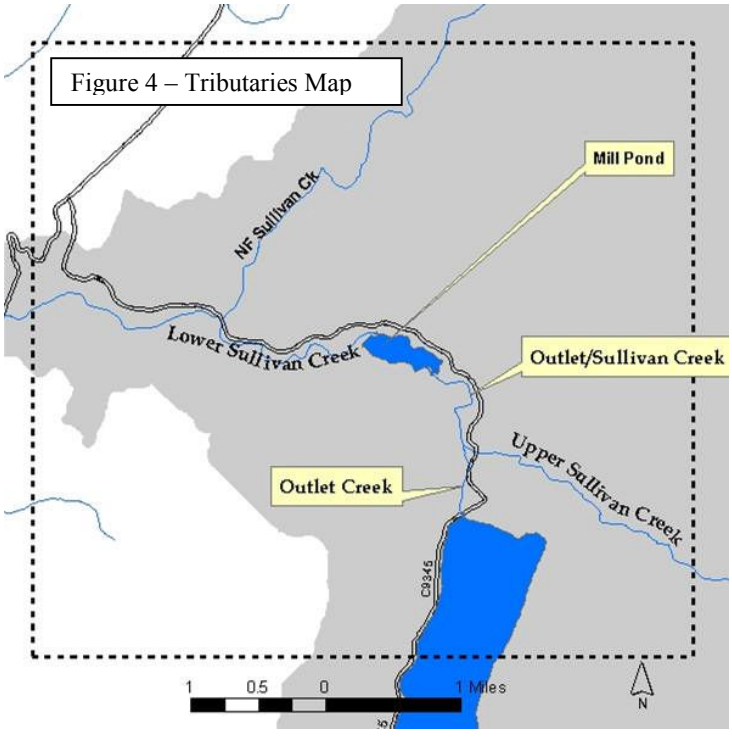


Figure 4 – Tributaries Map

Outlet/Sullivan Creeks between Mill Pond and Sullivan Lake:

Outlet Creek flows out of Sullivan Lake. About 2,500 feet (½ mile) below the dam, Outlet Creek joins Sullivan Creek. Mill Pond is formed from the impoundment of Sullivan Creek about 4,500 feet below this confluence[3].

Between Sullivan Lake and Mill Pond, Outlet/Sullivan Creek is a low gradient creek. For about 2,000 feet below the dam, Outlet Creek flows in a confined canyon formed by the moraine on one side and the mountain slope on the other. The valley is typically less

[3] It is about 4,500 feet following the creek. If you go straight down the valley it is about 3,500 feet. Sullivan Creek makes a big meander just before it enters Mill Pond.

than 100 feet wide. The geology of the mountain slope is Maitlen Phyllite; the soil formed on those slopes includes both Hartill-rock outcrop complex and Smackout loam. Hartill is formed in residuum and colluvium, while Smackout is formed in glacial till. The material on the other east and north side of the creek is glacial outwash.

Near the confluence with Sullivan Creek, the valley widens. In the spring of 1997, high flows on Sullivan Creek and Outlet Creek combined to flood a portion of CR 9345, severely damaging the road. The peak flow occurred in early June, with Sullivan Creek flowing about 1,300 CFS above the confluence, and Outlet Creek flowing about 800 CFS above the confluence.

Below the confluence Outlet/Sullivan Creek is again confined by glacial terraces. The area known as "Larsonville" appears to be a large old landslide mass just upstream of Mill Pond, on the east side of the creek.

Old landslide scars are visible along Outlet/Sullivan Creek. The narrow valley constrains the meanders, causing slumps along the canyon walls. Landslides along Sullivan Creek are discussed in newspaper articles[4] dating from the late 1800's.

Sullivan Creek at the confluence is about slightly larger than Outlet Creek. The upper Sullivan Creek watershed is about 70 square miles, while the watershed tributary to Sullivan Lake is about 52 square miles.

Sullivan Creek has a stream flow gauge above the confluence with Outlet Creek. Maximum flows occur in May and June, and minimum flows occur in the winter. Typical maximum flows are in the 500-900 CFS range.

Outlet Creek has a stream flow gauge. The flow regime in Outlet Creek is governed by releases at Sullivan Lake dam; maximum flows typically occur in the fall – starting about October and ending before December. In some years a short period of higher flows also occurs in the spring (June), perhaps to balance incoming flows. The maximum flows are typically around 100-300 CFS.

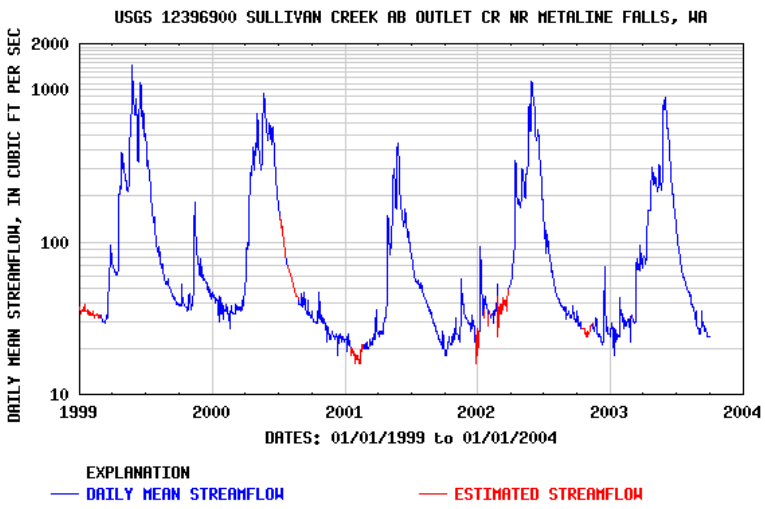


Figure 5 – Streamflow gauge printout

[4] Articles in the Newport Miner describe how these landslides impacted placer mining along the creek – often exposing new gravels for miners. Daniel Matson, personal communication.

Sullivan Creek has a stream flow gauge near Metaline Falls. Here the flow regime shows both the natural spring run-off and the dam releases. The adjacent graph shows stream flow for this site.

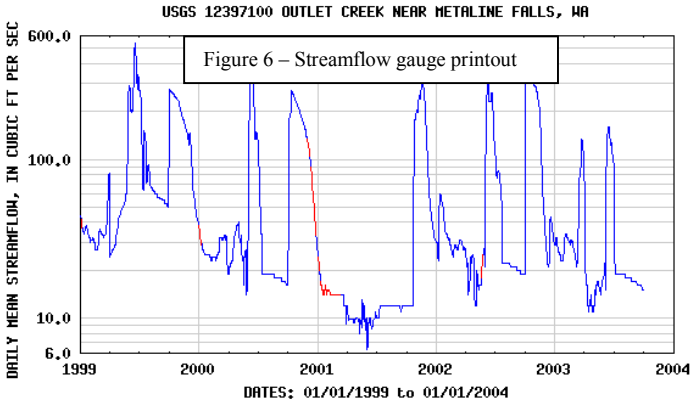


Figure 6 – Streamflow gauge printout

Mill Pond:

Mill Pond is a man-made feature. Historic photographs of the Mill Pond area prior to the dam show a stand of large western red cedar trees. The impoundment occurs in a low gradient segment of the creek (about 0.5% gradient).

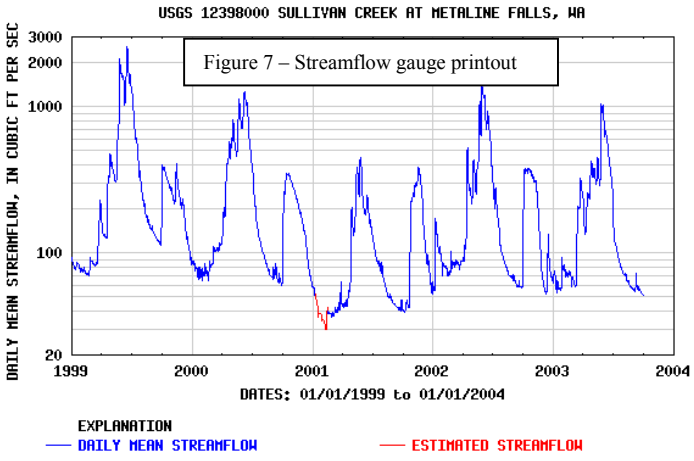


Figure 7 – Streamflow gauge printout

The surrounding valley bedrock is Maitlen Phyllite, but the slopes immediately adjacent to the pond are formed in glacial till. The side slopes range from about 20 to 40%. Soils in this area include Smackout on the south side and Aits on the north side. Both are formed over glacial till and are deep to bedrock. Because the lake level does not fluctuate significantly, riparian vegetation and topsoil occur to the waters edge.

Most of the dam is an earthen structure that is about 850 feet long and up to 500 feet wide. Most of the interpreted Mill Pond historic site is located on the dam. At the north end of the dam is a concrete outlet structure. The outlet has a fixed-elevation gate.

Sullivan Creek is the primary water flowing into Mill Pond. Mill Pond has a large depositional area at the inlet end. At the inlet, Sullivan Creek follows a meandering route dropping its bedload along the way. Based on aerial photos, much of the material was deposited in the 1960's and 1970's. The material appears to originate from a series of landslides and road failures upstream in the main stem of Sullivan Creek (Wasson and Glines, 1996; Jones, undated; Hinshaw, 1967). This depositional area is about 1,500 feet long, about 500 feet wide, and covers about 30 acres. Most of the deposits are well-vegetated with alder and brush. The shape and condition of the submerged portions of these deposits are unknown. If the dam were removed these deposits would be exposed.

Lower Sullivan Creek below Mill Pond:

Below Mill Pond, Sullivan Creek can be broken into two segments.

The first segment, from Mill Pond to just below the confluence with North Fork Sullivan Creek (about 9,000 ft.) is low to moderate gradient (varies from less than 1% just below Mill Pond up to about 2.5% near the North Fork). The surrounding bedrock is Maitlen Phyllite. The soils in this section are Bonner silt loam and Kiehl loam, found on the low floodplain, and Newbell silt loam, Aits loam, Threemile silt loam and Waits loam which are found on the upland slopes. The low gradient stream meanders in a moderately confining valley ranging from about 300 feet to about 100 feet wide. Landslides have occurred where the stream has undercut the upland slopes. In the spring of 1997, the stream undercut the adjacent valley hill slopes, causing a landslide that closed CR 9345.

The lower segment extends from near the confluence with North Fork Sullivan Creek to near the powerhouse. The gradient increase, the canyon becomes incised, and the stream straightens. In this segment, the channel is bedrock controlled. The lower slopes are dominated by rock outcrops, while the upper slopes are composed of rock outcrops and glacial till deposits. During its years of operations (1909-1956), landslides in the upper slopes of this area destroyed or damaged the flume system to the powerhouse several times.

Downstream Beneficial Uses

The following developments are built on or near Sullivan Creek, and *may be* subject to damage from flooding or landslide debris.

1. CR 9345 follows Sullivan Creek in some locations. Undercutting has damaged this road in the past.
2. SR 31 crosses Sullivan Creek at Metaline Falls with a bridge. After the bridge, SR 31 drops into a floodplain, and below #5 the road is about 10 vertical feet above the streambed.
3. The historic building that formerly housed the power generation plant is located on the floodplain next to Sullivan Creek just above SR 31.
4. The Metaline Falls sewage treatment facility lagoons are located near Sullivan Creek below SR 31. The lagoons are about 10 vertical feet above the streambed.
5. There is a landfill of cement kiln dust waste near Sullivan Creek above SR 31. The landfill was closed by constructing an impermeable cover on the surface, and by constructing a storm water management system. Groundwater leachate is strongly alkaline, and contains elevated concentrations of arsenic and lead. The landfill is above SR 31, and the streambed is about 10 vertical feet below SR 31. The creek makes a bend at this point, with some potential to undercut the slope.

6. The Metaline Falls water supply crosses Sullivan Creek, but the exact location of this crossing is not known.

Summary

The presence of the dam at Mill Pond has undoubtedly changed the amount of sediment and bedload entering lower Sullivan Creek stream. Given the background of landslides in this terrain, it is unclear to what extent this may have increased down cutting or lateral cutting – thereby increasing the amount or size of landslides.

Sullivan Dam operations have changed the magnitude of the peak flow event in Outlet Creek and downstream in Sullivan Creek. Prior to the dam, peak flows would occur in the spring in both Outlet and Sullivan Creek. The two streams may well have peaked at or near the same time. With dam operations, the spring flows from Outlet Creek are significantly reduced so the overall peak flow is perhaps half of what occurred under pre-dam conditions. It is possible the reduction in peak flows has reduced the extent, size and frequency of landslides on lower Sullivan Creek.

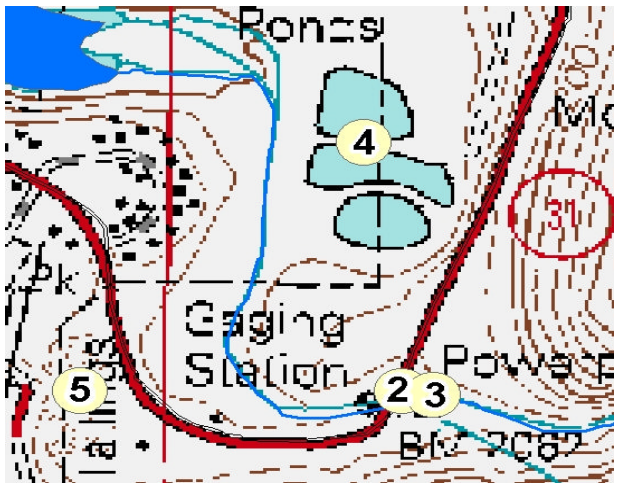
It is unclear how the reduction in bedload and the reduction in peak flows have interacted to impact slope stability, channel morphology, and flood risk in lower Sullivan Creek.

Scope of Analysis Area

The scope of the analysis area for soils and geology is—

- The area inundated by both Sullivan Lake and Mill Pond dams, with regard to sediment deposition during the life of the dams, material that may require removal or stabilization, and restoration of vegetation within the inundation zone;
- Harvey Creek upstream of Sullivan Lake for a distance of approximately 1,000 feet, with regard to the impacts of lake levels on sediment and bedload transport in Harvey Creek.
- Outlet and Sullivan Creeks, with regard to slope stability, channel conditions, and channel capacity.
- The Sullivan Creek watershed, with regard to peak flow and flooding.

Figure 8 – Map of developments



Fisheries and Hydrology

Existing Condition

Pend Oreille River:

Sullivan Creek flows into the Pend Oreille River downstream of Box Canyon Dam. Bull trout, westslope cutthroat trout, white sturgeon, mountain whitefish, northern pike-minnow, peamouth, redside shiner, sucker; sculpin and dace species were native to the Pend Oreille River system. Many of these species either have adfluvial life histories or are most likely resident within tributaries to Boundary Reservoir. The fluvial life stages of the bull trout and westslope cutthroat trout may no longer be present. Currently, bull trout are listed as threatened by the U.S. Fish and Wildlife Service and Region 6 of the USDA Forest Service considers the westslope cutthroat trout a sensitive species.

Historical data conflicted over the presence of chinook salmon and steelhead trout in the Pend Oreille system prior to impoundment (Scholz, et.al. 1985). A majority of the existing historical documentation indicates that the uppermost distribution of these species was either at Z Canyon or at Metaline Falls (the natural structure). Sullivan Creek is located just upstream of Metaline Falls (the natural structure). There is no historic data, presently known, that indicates that anadromous fish utilized habitat in the Sullivan Creek watershed.

Fish movement within the greater Pend Oreille River watershed and Lake Pend Oreille has been virtually eliminated by Albeni Falls, Box Canyon and Boundary dams. Construction of these dams without fish passage has possibly eliminated or greatly reduced adfluvial and fluvial populations of bull trout and westslope cutthroat trout (Bennett and Liter 1991).

Sullivan Creek:

Sullivan Creek watershed (1991-94) is the largest sub-watershed within the Boundary Reservoir reach. Mill Pond and Sullivan Lake dams have also isolated native species within the Sullivan Creek watershed as well as limiting movement of fish in Boundary Reservoir to only the lower 3.2 miles of this watershed.

Listed native salmonids and other salmonid species of concern (bull trout, westslope cutthroat trout and mountain whitefish) were once well distributed and abundant within the Sullivan Creek watershed. No year long, natural blockages to fish passage exist between Boundary Reservoir and the Sullivan Creek watershed (CES 1996).

With the probable restoration of passage conditions at both Albeni Falls Hydroelectric Project (USACOE email October 2003: Evan Lewis, personal communication) and Box Canyon Dam, re-colonization of the Boundary reach tributaries (including Sullivan Creek) by migratory bull trout from Lake Pend Oreille is likely to occur. Sullivan Creek is one of the largest tributaries to the lower Pend Oreille River. Portions of this

watershed have been designated as critical habitat for the recovery of the bull trout in northeast Washington. The watershed contains some of the best remaining spawning and rearing habitat for native salmonids in the lower Pend Oreille River.

The Sullivan Creek watershed, however, is not accessible (beyond 3.2 miles) to fluvial or adfluvial fish due to the presence of Mill Pond and Sullivan Lake dams. Fish passage at these dams is a high priority recommendation for the recovery of bull trout (Draft Bull Trout Recovery Plan, 2002). Bull trout are present in low numbers in the reach of the Pend Oreille River between Albeni Falls and Boundary Dams. Large (presumably adfluvial or fluvial) bull trout are present within Boundary Reservoir including lower Sullivan Creek. Bull trout have been found within the tributaries to Box Canyon Reservoir (BCR), and all life forms are present upstream of Albeni Falls Dam. Future efforts may include supplementation of locally derived adfluvial and fluvial bull trout and westslope cutthroat trout in order to strengthen these depressed stocks. Fish passage throughout the Pend Oreille River system will provide a migratory corridor for current bull trout and westslope cutthroat trout populations, as well as enhance supplementation efforts. The PUD, represented by Duke Engineering and Services (DE&S), has developed fish passage design alternatives for Box Canyon and Calispell Creek. The Army Corps of Engineers will complete an Albeni Falls Dam fish passage feasibility study by 2006.

Electro-fishing, hook and line, and trapping efforts in Boundary Reservoir, during August of 1999, have produced bull trout and cutthroat trout. The fish were large, 16-inch total length and greater and exhibited excellent condition factors (Al Solonsky, SCL per. comm. 1999: Joe Maroney, Kalispel Tribe per. comm. 1999). Water temperature may be a concern during late summer; however, westslope cutthroat and bull trout may be locating refugia within the reservoir during periods when temperatures are highest.

Table 3. Fish species composition of the Sullivan Creek watershed based upon historical and current records.

Fish Species	Native	Non-native	Extirpated
Bull Trout	X		
Cutthroat Trout	X		
Rainbow Trout		X	
Mountain Whitefish	X		
Brown Trout		X	
Brook Trout		X	
Kokanee		X	
Slimy Sculpin.	X		
Largescale Sucker	X		
Redside Shiner	X		
Dace Spp.	X		
Longnose Sucker	X		
Pygmy Whitefish	X		
Burbot	X		

* Native is defined as fish species indigenous to the Sullivan Creek system before European intervention and expansion.

Over the last ten years, the Sullivan Creek watershed has been surveyed for fish composition (Table 3) using gill nets (Sullivan Lake), snorkeling or electro-fishing methods, or a combination of methods. Biologists from the USDA Forest Service, R2 Consultants and DE&S Consultants independently conducted these surveys.

Table 4 – Fish species distribution

	Salmonids								Other		
Streams	Bull	Cut	Rain	Brown	Brook	Kokanee	Mountain Whitefish	Pygmy Whitefish	Burbot	Slimy Sculpin	Largescale Sucker
Upper Sullivan *		X	X	X	X	X	X			X	X
Lower Sullivan *	X	X	X	X	X		X		X	X	X
Sullivan Lake*		X	X	X		X		X	X	X	
N. Fork Sullivan Creek		X									

* Upper Sullivan is above Mill Pond and below Sullivan Lake Dam and Lower Sullivan is below Mill Pond. Sullivan Lake includes Noisy and Harvey Creeks.

The Sullivan Creek watershed has been surveyed for physical habitat using the Hankin and Reeves aquatic habitat inventory methodology.

Habitat above Mill Pond Dam is divided into two segments; mainstem Sullivan Creek and Outlet Creek and Sullivan Lake and its tributaries. Sullivan Lake dam blocks upstream migration of salmonids into Sullivan Lake and its tributaries.

The habitat of Outlet Creek, below Sullivan Lake, is limiting to salmonids due to high water temperatures during the summer months (>60 Degrees F.), scarcity of spawning gravels as well as lack of instream large woody debris (USFS unpublished data 1996). Additionally, a major annual fluctuation in the stream flow, caused by the present operation of the SCH, occurs between October and December. The fluctuation is caused by the present operation of the SCH by the PUD. During early October, the PUD opens the gates of Sullivan Lake Dam and within a 24 hour period increases lower Sullivan Creek stream flow from 50-60 cfs to 300+ cfs. This increase in flow from Sullivan Lake continues until the level of the former natural lake is reached and outflow equals inflow. The 300+ cfs flow slowly decreases through the months of October, November and into December until this equilibrium is reached at about 50+ cfs for the remaining winter months.

A municipal water supply dam is located within the North Fork of Sullivan Creek. Below this dam are several falls that block upstream migration of fish. The habitat above

this small dam is considered to be adequate for the continued reproduction of a cutthroat population. Limiting factors appear to be the small size of the watershed and entrainment, if it occurs, of individuals over the dam. Noisy and Harvey Creeks are the two fish bearing tributaries of Sullivan Lake. Aquatic habitat of Noisy Creek has never been inventoried, except during snorkeling surveys. This stream goes subsurface for most of the year limiting access to spring spawners only. Harvey Creek, a much larger tributary, has fair to excellent quality habitat. The limiting factors are a scarcity of large in-stream wood and pool habitat on main Harvey Creek and the fact that flow goes subsurface approximately 1000 feet from its mouth for 8 months of the year disconnecting Sullivan Lake from the rest of this watershed. The apparent reasons, for this existing condition, are past riparian harvest, fires and at least one major flood event, which have caused a significant amount of aggradation in the stream habitat within main Harvey Creek. The annual filling of the lake from March through June coincides with peak flows in Harvey Creek limiting the ability of the stream to move this accumulated bedload.

Habitat of upper Sullivan Creek and its tributaries ranges from fair to excellent in quality. Limiting factors in this stream include scarcity of in-stream large woody debris and pool habitat, substrate embeddedness and marginal summer water temperatures on main Sullivan Creek. These limiting factors can be traced back to past historic riparian logging, stream cleaning and the location of the existing road system. The habitat of the tributaries of Sullivan Creek above Mill Pond tends to be more complex and of better quality with steep gradients being the limiting factor.

More detailed discussion of surveyed stream habitat (Sullivan, Harvey, North Fork Harvey, Middle Fork Harvey, Deemer, Leola, Gypsy, Fireline, Copper, Mankato, Stony, Thor and North Fork Sullivan Creeks) may be found in USDA Forest Service stream survey data reports.

Limited data has been collected on the lakes and reservoirs within the Boundary Reservoir area of influence. Information that has been collected includes fish presence/absence surveys and limited water quality data.

All lands adjacent to Sullivan Lake are under USDA Forest Service management. Sullivan Lake dam located at the outlet to Sullivan Lake controls lake stage. Lake elevation was raised approximately 30 feet above the natural lake stage by the dam with an approximate max depth at controlled full pool of 312 feet. Sullivan Lake supports reproducing populations of brown, rainbow and cutthroat trout, kokanee, burbot, and pygmy whitefish, as well as dace, redside shiner and sucker species. Mill Pond Reservoir contains brown, rainbow, brook and cutthroat trout, kokanee and sucker species. It is unknown whether these populations are declining, increasing or stable. A limnological survey has been conducted on Sullivan Lake.

Mill Pond Reservoir is 63 surface acres in size. Past land management activities initiated excessive sediment transport (Wasson pers. comm. 1999) from the upper watershed with subsequent deposition of coarse particles within the transition zone and finer clays and

silts into the lacustrine zone of Mill Pond, thereby decreasing pool volume of the reservoir over time. Very little water quality or habitat data exists on Mill Pond reservoir. Mill Pond Dam intercepts large woody debris and gravel being transported downstream.

Although an aquatic habitat survey of Sullivan Lake will not be completed until the end of the summer of 2005, it is reasonable to suggest that littoral habitat is comprised of gravels and cobbles, which may provide limited shoreline spawning. Limiting factors to successful shoreline spawning and rearing would include drastic changes in lake levels, lack of littoral zone, and possibly lack of littoral cover**.** Sullivan Lake is considered oligotrophic, exhibiting low overall productivity (Smith, et al 2000). The zooplankton population levels are apparently sufficient to support kokanee and pygmy whitefish populations. Much of the habitat complexity for fish appears to be related to the differences in the lake substrate and less from large wood. The quality and quantity of spawning substrate in Sullivan Lake for lake spawning species such as pygmy whitefish, kokanee and burbot is unknown, but reproduction of these species continues to be successful.

Scope of Analysis

The scope of analysis for this Project includes the complete Sullivan Creek watershed. This watershed includes Sullivan Creek and its tributaries, as well as, Sullivan Lake and its tributaries.

Heritage

Existing Condition

The SCH has one site (45PO148) listed as eligible to the National Register of Historic Places.

The historic portion of the SCHP consists of two main components: the Mill Pond complex and the Sullivan Dam complex.

The Mill Pond historic complex is comprised of multiple components. These include:

1. Original 1909 log crib dam (inundated),
2. Existing (modified) concrete dam and spillway,
3. Existing log cabin,
4. Log flume,
5. Historic archaeological component,
6. Earthen dam/dike, and
7. Associated deteriorating historic structures.

The Sullivan Dam complex includes:

1. Existing (modified) concrete dam and spillway, and
2. Diversion ditch from Sullivan Creek to Sullivan Lake.

None of the above historic properties or historic property locations are currently evaluated to National Register standards. The Washington State Department of Archaeology and Historic Preservation (SHPO) files reflect that some of the above historic properties are documented as not eligible to the National Register. However, the SHPO, in a letter dated November 4 1993, concurred with the recommendation in the Cultural Resource Assessment for the SCHP that the project was eligible to the National Register as a Historic District.

The Project Area is within the traditional use area of the Kalispel Tribe, and archaeological resources discovered in these adjacent areas well-document the pattern of traditional Kalispel life ways (Thoms 1987, Sanders 1991). Archaeological site numbers 06210500082 and 06210500083 have been partially excavated and determined eligible to the National Register of Historic Places.

Scope of Analysis Area

The Scope of Analysis is the Area of Potential Effect (APE). The APE is defined as the geographical area or areas within which an undertaking can cause changes in the character or use of historic properties, if such properties exist (36 CFR 800.2 C). The APE does not discriminate between Federal and non-Federal land ownership. Depending on the scope of the undertaking, the APE may encompass an area greater than simply the Project boundaries. Specifically, if an historic property is found to be wholly or partially within the Project boundary, that property must be recorded and evaluated. For the SCH, the APE is the FERC licensed project boundary.

Terrestrial

Existing Condition

Sullivan Lake is a natural lake formed by a glacial moraine. Harvey Creek is the primary and largest stream entering the lake. Where Harvey Creek enters Sullivan Lake, the lake seasonally floods the depositional zone area. The mudflat contains numerous stumps from when the dam was built in 1909 and is exposed during the drawdown period (i.e. winter). Sullivan Lake has a seasonal fluctuation zone of 20 some odd vertical ft that affects establishment of shoreline riparian vegetative communities and the species dependent and associated with those communities.

Mill Pond log-crib dam was constructed in 1909. Historic photographs of the Mill Pond area prior to construction indicate that the reservoir flooded a stand of large western red cedar. Sullivan and Outlet Creeks are the primary water-sources flowing into Mill Pond. The impoundment occurs in a low gradient segment of Sullivan Creek. Because the lake

level does not fluctuate significantly, riparian vegetation and topsoil occur to the waters edge. At the inlet end, Sullivan Creek has created a large depositional area that is well vegetated with alder and brush.

Both dams may affect riparian species connectivity and contribute to habitat fragmentation.

Fauna

Threatened and Endangered Species:

Table 5 - (FWS reference: 1-9-00-SP-073 (118.0000)).

Species	Status	Essential Habitats Within or Adjacent to the Project Area
gray wolf *(Canis lupus)*	E	foraging - habitats that support big game, particularly winter ranges, calving/fawning sites denning - moderately steep slopes on south aspects within 400 feet of water seclusion from human disturbance
grizzly bear *(Ursus arctos)*	T	Grizzly bear recovery habitat is located on the Sullivan Lake Ranger District. spring foraging - lower elev. riparian areas, meadows, with succulent grasses, herbs, etc. summer/fall foraging - mid to high elevation, berry producing shrub fields denning - north side of ridge tops with deep soils seclusion from human disturbance

Grizzly bear (*Ursus arctos*)

Lands lying east of Sullivan Lake and north of County Road 9345 (just across from Mill Pond) are within the Selkirk Mountain Grizzly Bear Recovery Area. The week after Labor Day weekend of 2004, a collared bear moved through the Project area.

Palatable grasses, sedges, and forbs provide spring forage for grizzly bears. Within the Project area, these plants can be found principally within two small wetlands; one located at the south end of Sullivan Lake, and the other just southwest of Mill Pond. As outlined in the previous section on bald eagles, present operation of the Project is preventing littoral vegetation from establishing along the shoreline of Sullivan Lake. If this vegetation were able to develop, some of these plants could provide food resources for bears. However, the presence of developed campgrounds and trails, the ranger district compound, private residences, and County Road 9345 within close proximity to the lake could hamper the ability of bears to fully utilize these resources.

Gray wolf (*Canis lupus*)

The Northern Rocky Mountain Wolf Recovery Plan (USDI, 1987) identifies three areas for wolf recovery: the Yellowstone and Glacier National Park ecosystems, and central Idaho. Currently, there are no plans for wolf recovery in Washington State.

On rare occasion, wolves or wolf tracks have been reported within proximity to the Project area. Few sightings of wolves on the Colville National Forest can be confirmed as such. Many people who own land near the Project area own dogs, and some of these are wolf hybrids. Large coyotes seen for a brief time can be mistaken for wolves.

There is no evidence of a pack of wolves using the forest. A pack is basically a family unit containing an adult pair (the pack's leaders), this year's pups, and young of past years. The presence of a pack would mean that breeding is occurring and a pack territory has been established. At this time, animals seen on the forest appear to be transient, moving over large areas.

In the Northern Rocky Mountains, wolves prey mainly on big game animals (Hansen, 1986). Potential prey animals found within the Project area include mule and white-tailed deer, elk, moose, and Rocky Mountain Bighorn Sheep. "Forage, water, and cover are the primary habitat factors that limit deer and elk populations" (Thomas, et al, 1979). Optimum calving and fawning habitats contain high quality foraging areas and dense cover within close proximity to water.
The Project area and surrounding environs provide both summer and winter habitats for big game. Potential calving / fawning sites exist within the Project area; particularly along Outlet and Sullivan Creeks, and the wetland located southwest of Mill Pond.

Present operation of the dam on Sullivan Lake leads to a quick, 20-foot drop in the lake level in October of each year. This lower level is maintained until February. Thus, there is little opportunity for riparian plants such as sedges and willows to become permanently established along the lakeshore. These plants could provide important forage resources for big game. Riparian shrub patches could provide protective hiding cover that would make for secluded resting and watering sites. A fully developed littoral zone on Sullivan Lake could provide additional calving / fawning habitat for deer and elk.

Regional Forester Special Status Species (RFSSS):

Table 6 - RFSSS Wildlife Species with Potential to Occur in the Project Area.

Species	Potential to Occur	Range/Essential Habitats
bald eagle *(Haliaeetus leucocephalus)*	Documented (nesting confirmed)	foraging - rivers, large lakes with abundant fish (both Sullivan Lake and Mill Pond) nesting/perching - large trees typically located close to a foraging site (active nest on Outlet Creek) roosting - late and old structural stage stands with good canopy closure
common loon *(gavia imner)*	Documented (nesting not confirmed)	Loons require large lakes or rivers with abundant fish (example; Pend Oreille River) that have adequate shoreline vegetation to conceal a nest. Seclusion from human disturbance is critical to nesting loons.
Northern leopard frog *(Rana pipiens)*	Low	Found in wet meadows, potholes and riparian areas with much concealing cover, this frog may be very susceptible to predation by bullfrogs.

Species	Potential to Occur	Range/Essential Habitats
Eared Grebe *(Podiceps nigricollis)*	Documented (Sullivan Lake)	Not listed as sensitive for the Colville NF
Townsend's big-eared bat *(Corynorhinus townsendii)*	Documented (Lakeshore Mine)	hibernation - caves or mine adits that are generally close to freezing reproduction - nursery colonies are typically located in sites above 50 degrees F., often in old abandoned buildings roosting – caves, mine adits, old buildings, and the undersides of bridges
wolverine *(Gulo gulo)*	Low – likely to occur only during dispersal	denning - rock slides, caves, crevices, particularly in glacial cirque basins foraging - all habitats but particularly those where carrion can be found seclusion from human disturbance
great gray owl *(Strix nebulosa)*	Low	foraging - open, grassy habitat including open forest stands, selective and clear-cut logged areas, meadows and wetlands nesting - forest stands near lakes, wet meadows, and pastures nest structures - large, broken topped snags, abandoned raptor nests
sandhill crane *Grus canadensis)*	Low	feeding/resting - large tracts of undisturbed marshes or meadows nesting - isolated sites with good cover more than ¼ mile from roads
Peregrine falcon *(falco peregrinus anatum)*	Low	foraging – habitats that provide waterfowl, upland game birds, and larger passerine birds; particularly open marshes, rivers, seacoasts nesting – scrapes placed on a ledge of a tall (150+ foot) sheer cliff.
Pacific fisher *(Martes pennanti)*	Low	Fishers inhabit dense coniferous or mixed coniferous/deciduous forests with good canopy closure. They prefer late / old structural stage stands. travel habitat – stands adjacent to lakeshores, riparian areas, ridges denning – large hollow logs or snags, tree cavities, brush piles, etc.
Harlequin duck (*Histrionicus histrionicus*)	Documented	nesting – along clear rock streams foraging – stream bottoms for crustaceans and mollusks
Eared grebe (*Podiceps nigricollis*)	Likely to occur	nesting – on marshy ponds foraging – dives in ponds for small aquatic insects and crustaceans
Pygmy shrew (*Microsrex hoyi*)	Likely to occur	habitat – wooded and open areas, wet or dry

Bald Eagle (*Haliaeetus leucocephalus*)

Nest trees selected by bald eagles are commonly among the largest in the stand, often towering above the main forest canopy. Such trees provide a panoramic view of the surrounding area, a sturdy platform on which to build a large nest, and an unobstructed flight path to and from the nest (Stalmaster, 1987). Perch trees are typically located close to a foraging area such as the Sullivan Lake (Steenhof et al. in USDI, 1986). Eagles consistently use preferred branches for perching.

Active eagle nests are typically well distributed along the shoreline of a river or lake. Nesting pairs defend a nest territory in order to monopolize food resources in an area. Active territories include favored perch, roost, and nest trees that are used exclusively by the nesting pair. In Washington State, nest territories were found to be as large as 8.14 square kilometers (Stalmaster, 1987). Grubb (in USDI, 1986) found the average nest territory in western Washington to have a radius of 2.6 kilometers.

In the spring of 2003, a bald eagle pair established a new nest in a snag located on Outlet Creek, about 100 yards below the Sullivan Lake dam. This nest was started quite late in the season and was eventually abandoned. This nest was active again in 2004. As was

the case the previous year, incubation by the eagle pair was initiated late in the season and the nest was abandoned. The second nesting attempt at this site (2004) failed again. Since 2004 the eagle nest has been active.

There may be a new bald eagle nest on the south shore of Sullivan Lake. The week of March 14, 2005, two adult birds are near what appears to be a stick platform.

The most important component of habitat used by eagles is a foraging area that provides enough food with a minimum of disturbance from humans (Stalmaster, 1987). Typically a few bald eagles (1-5 or so) are observed at the mouth of Harvey Creek (main Sullivan Lake inlet) from about mid November through December or later, when the kokanee are spawning in the creek. One or two birds may be seen on Outlet Creek at this time as well. In the springtime starting about April, one or more birds may be seen at these same locations. Eagles are occasionally seen foraging on Mill Pond during the summer.

As the Project is presently operated, the water level of Sullivan Lake is drawn down 20 feet each year from October to February. Because of this annual draw down, algae, aquatic vegetation, emergent vegetation, and riparian shrubs cannot gain a permanent foothold along the edge of the lake. These plants would provide cover for shoreline spawning fish. They would also provide habitats for aquatic invertebrates on which fish feed. The annual fluctuation in the lake's water level may also be causing the eggs of fall, shoreline-spawning fish to be de-watered.
Before the dam on Sullivan Lake was constructed, the extent of the riparian and in-stream habitat on Harvey Creek was greater than it is today. Present operation of the dam continues to suppress the development of this habitat on Harvey Creek: the major spawning area for fish in Sullivan Lake.

When the gates of Sullivan Lake dam are opened the first week of October, there is a substantial increase in flow in Outlet and Sullivan Creek. Thus, fall spawning fish in these creeks have access to more available habitat at this time. However, flows return to their pre-October levels by the beginning of December, leaving many redds in the temporarily expanded stream habitat de-watered.

All of the above continuing impacts to fish productivity act to reduce the potential forage base for bald eagles and other fish eating birds in the Project area.

Common loon (*Gavia imner*)

Loons are totally dependent on water and prefer to nest on the edges of large (>40 acre) lakes and rivers. They select the most secluded shoreline habitat available for nesting and are prone to abandoning an active nest if disturbed by human activity. Nests are typically placed in dense, concealing vegetation within a few feet of the water's edge. Loons are awkward on land, so a gentle grade to the shoreline is desirable for nesting purposes.

During migrations, loons sometimes use Sullivan Lake and Mill Pond as resting and foraging sites. There are no known records of loons nesting on either water body. Before permanent developments such as campgrounds, access roads, trails, interpretive sites, etc., were constructed on these lakes, loons may have used them for nesting. Of the two lakes, Sullivan Lake likely had much greater potential for nesting opportunities owing to its large size.

The Project as it is presently operated provides little opportunity for loons to successfully nest on Sullivan Lake. Early in the nesting season the water level of the lake is down, exposing an open "bath tub ring" of rock and silt along the lakeshore. There is little vegetative cover near the water at this time of year within which to conceal a nest.

As described in the previous section on bald eagles, present operation of the Project results in the suppression of fish productivity in Sullivan Lake. This, in turn, reduces the forage base for fish eating birds like loons.

Northern leopard frog (*Rana pipiens*)

This species requires wetland habitats where there is an abundance of concealing cover. Northern leopard frogs prey upon insects, spiders, sowbugs, leeches, fish, amphibians, snakes, and small birds (Leonard, et al, 1993). In the summer they may be located far from water. This frog hibernates on the bottom of ponds or slow moving streams. Identified threats to this species include predation and competition from introduced species (particularly bullfrogs), and application of agricultural chemicals (McAllistar, et al, 1999). No records of this species from the Project area exist in district records.

Potential leopard frog habitats in the Project area include two discrete wetlands. One site is a small, seasonally inundated area located at the south end of Sullivan Lake. The Sullivan Lake Dam as it is presently operated provides little opportunity for aquatic and emergent plants to become permanently established elsewhere along the lakeshore. The second wetland in the Project area is a larger, permanently flooded site located southeast of Mill Pond. This wetland contains aquatic and emergent plants, and riparian shrubs.

The following invertebrates are now listed as RFSSS for the CNF

Species	**Habitat Present?**	**Comments**
meadow fritillary (*Boloria bellona*)	Yes	Common in the eastern US in hayfields and human-disturbed habitats. In the west they occur in meadows and openings in aspen or pine forests.
Great Basin fritillary (*Speyeria egleis*)	No	This species uses forest openings and edges, generally at higher elevations.
Rosner's hairstreak (*Callophyrus nelsoni*)	Yes	Habitat for this species includes openings and edges in coniferous forest around western red cedar stands.
magnum mantleslug (*Magnipelta*	Yes	Found in a variety of low to mid-elevation sites, often with water in the general vicinity.

mycophaga)		
Fir pinwheel (*Radiodiscus abietum*)	Yes	Most often found in moist and rocky Douglas fir forest at mid-elevations in valleys and ravines and sometimes in western redcedar. Often found in or near talus of a variety of rock types, or under fallen logs.
masked duskysnail (Lyogyrus spp.)	Yes	This species is a kettle lake associate.

CNF Management Indicator Species:

Table 7 – Management Indicator Species with Potential to Occur in the Project Area.

Species	Potential to Occur in the Project Area	Habitat Represented
Grizzly Bear	Documented	Specific habitat components and seclusion
Caribou	Low	Specific habitat components
Big Game	Documented	Winter range
Blue Grouse	Low	Winter habitat – mature trees or clumps of trees along ridge tops. Nesting habitat – open forest with grass/shrub understory at lower elevations.
Franklin's Grouse	Low	Young lodgepole pine with interspersed mature spruce.
Northern Three-toed Woodpecker	Good	Mature lodgepole pine or subalpine fir.
Pileated Woodpecker	Documented	Mature and old growth forest in Douglas fir or cedar/hemlock working group. Large snags and logs.
Woodpeckers	Documented	Special habitat component snags.
Barred Owl	Documented	Lower elevation mature and old growth forest.
Marten	Good	Mature & old growth mesic conifer forest, down trees at moderate to high elevations.
Beaver	Good	Aquatic & riparian, aspen or willow.
Large Raptors/Great Blue Heron	Documented	Nest trees.
Northern Bog Lemming	Low	High elevation bogs.
Trout	Documented	Lacustrine, riverine & riparian.

Other Wildlife Species:

Big game - The Project area and surrounding environs provide winter range habitat for several species of ungulates including Rocky Mountain bighorn sheep, elk, and mule and white-tailed deer. A small herd of Rocky Mountain Bighorn Sheep use Hall Mountain (east side of Sullivan Lake) throughout the year. There was a feeding station for these animals located at Noisy Creek at the south end of Sullivan Lake. The WDFW phased out this operation in winter of 2002-2003. The herd numbers around 35 animals now and

is not hunted. Small bands of elk live in the area. A good elk-viewing site is in a farmer's field about 2 miles west of Mill Pond on County Road 9345 (Sullivan Lake Road). Up to 30 animals may be seen in the spring in this field. The Project area provides winter range for elk, white tailed deer and some mule deer.

Present operation of the dam on Sullivan Lake leads to a quick drop in the lake level of over 20 feet in October of each year. This lower level is maintained until February. Thus, there is little opportunity for riparian plants such as sedges and willows to become established along the lakeshore. These plants could provide important winter forage resources for elk and deer, as well as protective hiding cover that would better enable these animals to find resting sites and access to water during the warm months.

Waterfowl - Sullivan Lake and Mill Pond support several pairs of breeding ducks and grebes each year. Mill Pond tends to support a greater diversity of species and produce more broods than Sullivan Lake. This may be because Mill Pond has comparatively greater amounts of aquatic and emergent vegetation, shallow water areas, and areas of dense cover along its shoreline. The Sullivan Lake dam as it is presently operated provides little opportunity for riparian and aquatic plants to become permanently established along the margins of Sullivan Lake. These plants could provide concealing shoreline cover for nesting ducks and grebes. Aquatic plants and the macro-invertebrates they support could provide food resources for many water birds. In addition, present operation of the dam suppresses the fish productivity of the lake (as described in the section on bald eagles). This indirectly results in a reduced forage base for fish eating birds like mergansers.

Harlequin ducks nest on the banks of swift moving mountain streams. They dive into the water to forage on macro-invertebrates on the stream bottom. Each year, a few pairs of harlequin ducks nest on Harvey and Sullivan Creeks above Mill Pond. Before Mill Pond was created, the section of Sullivan Creek that was inundated likely looked very similar to forested riparian habitats higher up in the drainage. The section of creek that was inundated might have provided nesting habitat for this species.

Land birds - Many neotropical migrant songbirds are associated with riparian shrub habitat. This habitat type is important to willow flycatchers, yellow warblers, song sparrows, and a number of other songbirds. The margins of Mill Pond and the wetland upstream from the pond provide habitats for a wide array of land birds. The rapid fluctuation of the water level of Sullivan Lake prevents riparian vegetation from gaining a foothold along most of that lake’s shoreline. The bird conservation goal for this habitat on National Forests in Washington and Oregon are to have no net loss of habitat, to enhance connectivity, enhance for multiple layers, and to minimize degradation (Altman, 2000).

Flora

RFSSS Species:

Sensitive plant species, habitat and its potential to occur within the Project area. Those plants known from the Project are indicated as documented. The potential for sensitive plants suspected to occur in the Project is rated as low or good.

Table 8 – RFSSS Plant Species

Vascular Plants		
Species	**Potential to Occur**	**Habitats**
Nuttal's pussy-toes *(Antennaria parvifolia)*	Low	Dry, open places, on sandy or gravelly riverbanks, openings of ponderosa pine forests 1900-2600 ft.
Least bladdery sedge *(Astragulus microcystis)*	Low	Open woodlands near shorelines, riverbanks, floodplains, 1900-2100 ft.
Prairie moonwort *(Botrychium ascendens)*	Good	Dry meadows, 3000-3400 ft.
Crenulate moonwort *(Botrychium crenulatum)*	Good	Western redcedar-western hemlock forests, streambanks, floodplains, 2030-4600 ft.
Western moonwort *(Botrychium hesperium)*	Low	Dry to moist meadows, 3200-3300 ft.
Skinny moonwort *(Botrychium lineare)*	Good	Western redcedar-western hemlock forests, streambanks, floodplains, 2000-4000 ft.
Two-spiked moonwort *(Botrychium paradoxum)*	Good	Dry meadows, perennial and intermittent streams, 2500-3600 ft.
Stalked moonwort *(Botrychium pedunculosum)*	Low	Dry to moist meadows, perennial streams, 2500-3300 ft.
Hair-like sedge *(Carex capillaris)*	Low	Streambanks, wet meadows, moderate to high elevations.
Bristly sedge *(Carex comosa)*	Low	Marshes, lake margins, drainage ditches, wet meadows, 30-2000 ft.
Yellow bog sedge *(Carex dioica* var. *gynocrates)*	Low	Bogs, marshes, moderate to high elevations.
Yellow sedge *(Carex flava)*	Documented	Fens, bogs, wet meadows and ponds, 2420-4300 ft.
Bronze sedge *(Carex foenea)*	Documented	Marshes, 2585 ft.
Porcupine sedge *(Carex hystricina)*	Low	Wet meadows, ponds, marshes, seeps, 550-1500 ft.
Russet sedge *(Carex saxatilis var. major)*	Low	Wet meadows and margins of lakes and streams.
Bulb-bearing water hemlock *(Cicuta bulbifera)*	Low	Marshes, bogs, wet meadows, edge of ponds, shores of beaver ponds, shallow standing water, 2200-3720 ft.
Water avens *(Geum rivale)*	Low	Wet meadows, fens, bogs, perennial streams and shrub wetlands, 2900-3700 ft
Stellar's rockbrake *(Cryptogramma stelleri)*	Low	Cliffs, 3000-35000 ft.
Yellow lady's slipper *(Cypripedium parviflorum)*	Low	Perennial streams on limestone rock under mixed conifer forest, 2300-2700 ft.
Yellow mountain avens *(Dryas drummondii)*	Low	Cliffs, 2000 ft.
Crested shield fern *(Dryopteris cristata)*	Low	Fens, wet meadows and wooded swamps, 2150-4100 ft.
Green keeled cotton-grass *(Eriophorum viridicarinatum)*	Low	Fens and marshes, 2900-4650 ft.
Creeping snowberry *(Gaultheria hispidula)*	Low	Moist areas in coniferous woods, 2960-3360 ft.
Canadian St. John's -wort *(Hypericum majus)*	Low	Mudflats, 1500 ft.

Treelike clubmoss *(Lycopodium dendroideum)*	Low	Coniferous forests, 3000-3650 ft.
Marsh muhly (Muhlenbergia glomerata)	Low	Bogs, fens, streambanks, wet meadows, marshes, lake and pond margins, 2950-3380 ft.
Adder's tongue (Ophioglossum pusillum)	Low	Moist meadows, 2800-3200 ft.
Small northern bog-orchid (Planthera obtusata)	Low	Moist meadows and perennial streams in coniferous forests, 4100-4400 ft.
Hoary willow *(Salix candida)*	Low	Fens, 2400-3000 ft.
MacCall's willow *(Salix maccalliana)*	Low	Fens, 2400-3000 ft.
Northern willow *(Salix pseudomonticola)*	Low	Fens, 2900 ft.
Black snake-root *(Sanicula marilandica)*	Low	Bogs, fens, streambanks, floodplains, benches, 1800-3050 ft.
Blue-eyed grass *(Sisyrinchium septentrionale)*	Low	Dry to moist meadows, perennial streams, 2200-3850 ft.
Prairie cordgrass *(Spartina pectinata)*	Low	Sandy, silt loam soil adjacent areas seasonally flooded and moist in late summer along large rivers, 2000 ft.
Woodsage *(Teucrium canadense* ssp. *viscidum)*	Low	Wet margins of lakes and ponds, streambanks, 1500-2300 ft.
Purple meadowrue *(Thalictrum dasycarpum)*	Low	Dry meadows, mixed conifer forests, riverbanks, floodplains, 2000 ft.
Velvet-leaf blueberry *(Vaccinium myrtilloides)*	Low	Western redcedar-western hemlock forests, 2000-3000 ft.
Non-Vascular Plants: Lichens		
Brook lichen *(Dermatocarpon luridum)*	Low	Aquatic; on rocks, boulders and bedrock in streams, rivers, or seeps, usually submerged or inundated for most of the year.
Jellyskin *(Leptogium burnetiae* var. *hirsutum)*	Low	Typically epiphytic on trees but also on decaying logs, rocks and moss.
Blue jellyskin *(Leptogium cyanescens)*	Low	Tree bark of conifers and hardwoods, logs, mossy rocks in cool, moist micro-sites.
Naked kidney lichen *(Nephroma bellum)*	Good	On branches and twigs of trees, especially conifers. Also on mossy rocks in humid forests.
Black saddle lichen *(Peltigera neckeri)*	Low	Mossy logs, soil and tree bases in wet forested habitats.
Fringed pelt *(Peltigera pacifica)*	Low	Mossy logs, soil and rocks in moist forest habitats
Non-vascular Plants: Mosses		
Luminous moss *(Schistotega pennata)*	Low	Damp acidic rock, soil and decaying wood, in dark places (openings of caves or mine shafts), in rock crevices or overhangs, animal burrows, on shaded banks, in crevices of root balls, fallen trees or around tree roots in dark forests.
Splashzone moss *(Scouleria marginata)*	Low	Semi-aquatic on rocks along the edge of streams.
Tetraphis moss *(Tetraphis geniculata)*	Low	Moist coniferous forest with large down logs. It occurs on the cut or broken ends, or lower sides of decay class 3, 4, 5 rotted logs or stumps and occasionally on peaty banks in moist coniferous forests from sea level to subalpine elevations.

There is little information regarding the number, distribution and condition of sensitive plants in the Project area. *Carex flava* (yellow sedge) and *Carex foenea* (bronze sedge) are the only USDA Forest Service (Region 6) sensitive plant species documented from the Project area (USDA Forest Service 2005). Each is known from one location in the area. Because these two plants are documented from less than 20 sites in the state, the Washington National Heritage Program (WNHP) category for them is sensitive. This means the species are "vulnerable or declining and could become endangered or threatened in the state without active management or removal of threats (WNHP 1997)."

Other Plant Species:

The Washington Natural Heritage Program (WNHP 1997) tracks rare plants on all lands within the state and assigns them to one of six categories: Endangered, Threatened, Sensitive, Possibly Extirpated from or Extinct in Washington, Review (Groups 1 or 2) and Watch.

Five taxa documented from the Pend Oreille Valley are considered Review Taxa. These are plants for which more information is needed to accurately assess their category of rarity. Chaffweed (*Centunculus minimus*), golden corydalis (*Corydalis aurea*), water star-grass (*Heteranthera dubia*) and common butterwort (*Pinguicula vulgaris*) are on the Review Group 1 list, which includes taxa for which more fieldwork is needed to assess their rarity and the degree to which they are threatened. Orange balsam (*Impatiens aurella*), on the Review Group 2 list, is a taxa with unresolved taxonomic questions.

Three plants known from northeastern Washington are in the WNHP Watch Category. These include the green spleenwort (*Asplenium trichomanes*), smooth cliff-brake (*Pellaea glabella var. simplex*) and woolgrass (*Scirpus antrocinctus*), formerly recognized as *S. cyperinus*). Watch Category taxa are more abundant and/or less threatened in Washington than previously thought. Botanical surveys in Pend Oreille Valley in the last eight years revealed several plant species that were not known to occur in Washington: *Carex tenera* (slender sedge), *Galium palustre* (common marsh bedstraw) and *Hedeoma sp. nov.* (penny-royal). An evaluation of their rarity category in Washington is needed.

In the Flora of Pend Oreille County, Washington (Layser 1980) the author states, "Sullivan Lake and its immediate environs do not represent unique plant habitat in the sense that has been considered earlier. Sullivan Lake is treated here because recreation attractions bring many people to visit the area about the lake. Some of the interesting or attractive plants to be found about the lake are given below. At one time before the large cedars were cut and the lake level raised, the place where Harvey Creek entered the lake may have been a particularly interesting and floristically rich area. Fluctuating water levels have now converted that place into mudflats that support various waterweeds for part of the year. One small, but unusual, plant to look for in the pools as the lake recedes is *Tillaea aquatica* [Crassula aquatica]."
Layser continues with a couple of lists, "Some interesting plants occurring on the bench at the north end of Sullivan Lake area:"

Scientific Name	Scientific Name
Allium cernuum	*Hieracium albiflorum*
Calypso bulbosa	*Lilium columbianum*
Carex rossii	*Oryzopsis asperifolia*
Gaultheria ovatifolia	*Pyrola asarifolia asarifolia*
Habenaria unalascensis	*Vaccinium myrtillus*

"Some interesting plants occurring on the rock outcrops along the Sullivan Lake trail include:"

Scientific Name	Scientific Name
Clarkia pulchella	*Saxifraga bronchialis austromontana*
Corydalis aurea	*Sedum lanceolatum*
Crptogramma crispa acrostichoides	*Selaginella wallacei*
Montia parvifolia	*Woodsia scopulina*

Kreager collected in Pend Oreille County as far north as Box Canyon. Sullivan Lake is mentioned in 1950 when W. B. and V. E. Cooke collected there. From 1967 to 1973 Earle Layser collected throughout Pend Oreille County in preparation for his book on the flora of the county.

Noxious Weeds:

Table 9 - Documented and Suspected Noxious Weeds in the Project Area.

Class "A" Noxious Weeds – New Invader or Potential New Invader

Common Name	Scientific Name
Salt cedar	Tamarix ramosissima
Indigo bush	*Amporpha fruiticosa*
Pepperweed	*Lepidium latifolium*
Garden loosestrife	*Lysimachia vulgaris*

Class "B-designate" Noxious Weeds - New Invader to Area

Common Name	Scientific Name
Policeman's helmet	Impatiens glandulifer
Leafy spurge	*Euphorbia esula*
Plumeless thistle	*Carduus nutans*
Meadow knapweed	*Centaurea nigra*
Purple loosestrife	*Lythrum salicaria*
Yellow hawkweed	*Hieracium caespitosum*

Class "B" Noxious Weeds – Established Infestations

Common Name	Scientific Name
Yellow hawkweed	Hieracium caespitosum
Japanese knotweed	*Polygonum sachalinense*
Giant knotweed	*Polygonum cuspidatum*
Diffuse Knapweed	*Centaurea diffusa*

Spotted Knapweed	*Centaurea biebersteinii*
Oxeye daisy	*Leucanthemum vulgare*
Sulfur Cinquefoil	*Potentilla recta*
Eurasian water-milfoil	*Myriophyllum spicatum*

Class "C" Noxious Weeds – Established Infestations

Common Name	Scientific Name
Reed canary-grass	Phalaris arundinacea
Canada thistle	*Cirsium arvense*
St. Johns-wort	*Hypericum perforatum*
Absinth wormwood	*Artemisia absinthium*

Class "A and B-designate": Weeds in these classes occur at a few sites within Pend Oreille County, are considered an economic threat.

Class "B" and "C": These classes are mostly common in Pend Oreille County and have an overall goal of containment and reducing the negative impact to below and acceptable levels.

When the water level of Sullivan Lake is drawn down in the fall, there is an exposed "bath tub" ring around the lake that is mostly less than 100 feet wide. After many years of wave action and fluctuating lake levels, there is much exposed rock in the draw down zone and soils for the most part are very sterile. The exception to this condition is at the shallow, south end of the lake where a several hundred foot wide fan of alluvial sediments becomes exposed during draw down.

Existing noxious weeds in the Sullivan Lake area that could potentially invade areas of exposed soils include spotted and diffuse knapweed, Dalmatian toadflax, St. John's wort, meadow and orange hawkweeds, plumeless thistle, and common tansy. These plants are presently unable to establish in the exposed soils of Sullivan Lake since they would become inundated as the lake fills each spring.

Mill Pond has a stable lake level and a well-vegetated shoreline. Noxious weeds exist in the area around the pond; particularly in the interpretive site located west of the pond. Knapweeds and hawkweeds are the most prevalent species in this area.

Scope of Analysis Area

The analysis area includes the following:

- Sullivan Lake, Mill Pond, Outlet Creek, Sullivan Creek (between Outlet Creek and Mill Pond), Lower Harvey Creek (up 0.25 mile from its mouth) and the riparian habitat conservation areas (RHCAs) around these water bodies,
- The BEMA and BECA used by the nesting pair of bald eagles on Outlet Creek and Noisy Creek campground, if it is larger than the RHCAs,

- Areas of existing noxious weed infestations or exposed soils within 0.5 mile of the water bodies listed above. These would include the interpretive site located adjacent to and west of Mill Pond, and exposed cut slopes above Sullivan Lake on County Road 9345 (Sullivan Lake Road).
- For the gray wolf and grizzly bear. Salmo and Sullivan-Hughes Grizzly Bear Management Units.

Engineering

Existing Condition

Sullivan Lake Dam, National Inventory of Dams No. WA00011:

Sullivan Lake Dam is comprised of concrete gravity spillway section and two concrete gravity wing walls on each side of the spillway. The dam is 34 ft. high and 210 ft. long. The spillway crest is 58 ft. long and accommodates six vertical 5 ft. wide by 4 ft. high wooden gates. At the base of the spillway and low-level discharged are manually operated by personnel form the Box Canyon Project.

Sullivan Lake is maintained at a constant elevation of 2,588.66 ft. mean sea level (MSL) for recreational purpose during the months of May through September. Beginning in October, Sullivan Lake is drawn down to provide storage for spring runoff. The minimum elevation of Sullivan Lake Dam is 2,564 ft. MSL. Sullivan Lake dam is a high hazard, class B dam (according to the USDA Forest Service administration classification and hazard assessment classification contained in USDA Forest Service Manual 7500). There is an emergency action plan (EAP) proposed in 1999 and updated annually by the PUD. Its purpose is to clarify outline procedures for emergency personnel in event of dam failure. It should be noted that failure of the Sullivan Lake Dam is more likely to occur when Sullivan Lake is full during the period from May through September. Downstream along Outlet Creek are seasonal passages. These are currently monitored by the PUD.

Mill Pond Dam, National Inventory of Dams No. WA00012:

Mill Pond Dam is located about 1.5 miles downstream form Sullivan Lake Dam. The dam is a composite structure consisting of a concrete gravity dam and an earthen dike. The concrete gravity dam is about 55 feet high from foundation to the crest of the un-gated spillway at El. 2505.7. The trapezoidal-shaped spillway section is notched in the center of the dam. The spillway crest length is 34 feet at El. 2505.7, and 81 feet at El. 2513.9. The total top width of the dam is about 120 feet. The earthen dike extends beyond the left abutment of the gravity dam a distance of about 850 feet. The dike has a crest length of about 10 feet and side slopes of 1.5 H: 1.0 V upstream and downstream. The crest of the dike is at El. 2517.5, except for the far left 250 feet, which is set at about

El.2515.5 to pass emergency flood flows. A pedestrian bridge was constructed in 1989 over the top of the dam as part of a cost sharing recreational enhancement project.

Mill Pond Dam has a 1,962 acre-feet capacity and covers 80.5 acres at its normal peak elevation of 2,505.7 feet. The overflow section operates continuously and is of such a shape that it is almost impossible to be plugged by debris, even with the pedestrian bridge which provides a 10-ft. opening between the bottom of the bridge and the top of the spillway crest. The flow of water over the spillway increases as the flow of Sullivan Creek increases.

Mill Pond Dam is a high hazard, class B dam. There is EAP, which is updated annually by the PUD.

Other Facilities Possibly Affected by the Sullivan Lake and Mill Pond Dam Impoundments

Well:

The sole water source for the Sullivan Lake Ranger District administrative site is an 8''cased, 62 foot deep well, located west of the main office. It tests at 55 gallons per minute. Significant change in the lake level could impact the well.

Septic tank/ Drain fields:

Currently the office, bunkhouse, fire warehouse, and two residences east of the Sullivan Lake dam have septic tank drain field systems.

Inlet Bridge:

This 78 foot, 3 span bridge was built in 1938. It is located on the inlet to Sullivan Lake on Harvey creek. This structure is owned by Pend Oreille County and is on NFS land. There are currently plans to replace the structure with analysis and design planned for 2007.

Outlet Bridge:

This 190 foot multi-span structure was constructed in 1992 and is in good condition. It sits about 100 feet upstream of Sullivan Lake dam. It is supported by concrete pilings. During construction, liquefaction was experienced on the east most piling. Pend Oreille County currently owns the bridge and has maintenance responsibility. The bridge is located on NFS land.

Scope of Analysis Area

The scope of this analysis is confined to the dams and nearby facilities that may be impacted by changes in the dam structures, impoundments or project operations.

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